

NETL Researchers Pursue Gas Hydrates Across the Globe

Over the past 18 months, NETL researchers have pursued natural gas hydrates from the Equator to the Arctic Circle; including several different cooperative expeditions in the Bay of Bengal, Andaman Sea, East Sea/Sea of Japan, South China Sea, Gulf of Mexico, and Alaska North Slope. Gas hydrates are solid combinations of natural gas and water that are found in environments of high pressure and/or extremely low temperatures such as the Arctic regions and within shallow sediments of deep-water continental shelves across the globe. They have immense potential as a future energy resource and are also an important, yet poorly understood, component of the global carbon cycle and global climate change.

Earlier this year, Kelly Rose helped forge new international collaborations for DOE, participating as a geologist and sedimentologist for separate one-month expeditions in the South China Sea and South Korea's East Sea. Rose participated in these two separate international gas hydrate expeditions at the invitation of Geotek, a marine service company commissioned to conduct shipboard research activities during these studies. In May 2007 Rose participated in China's four-week drilling and coring expedition in the South China Sea, and in October 2007 Rose served as lead sedimentologist for South Korea's 5-week methane hydrates coring and drilling expedition in the East Sea. The goal of both the Chinese and South Korean efforts was to test pre-expedition exploration techniques for identifying the location and occurrence of sub-seafloor methane hydrate accumulations and fully characterize those accumulations through drilling and coring activities and subsequent analyses.

In addition, in July 2007, Rose and NETL's Eilis Rosenbaum participated in the Naval Research Laboratory's two week expedition in the deepwater Gulf of Mexico's Aliminos Canyon region. This study collected shallow sub-seafloor piston cores and thermal gradient data to help constrain models for fluid and methane flux in the region. Rosenbaum participated as a technician in the shipboard geochemistry lab. Rose, during this, and other recent gas hydrate expeditions, studied hydrate bearing and non-hydrate bearing core sub-samples to help characterize the lithostratigraphic features of these cores to help constrain the relationship between geology and hydrate distribution at these expedition sites. Ultimately, these data may help improve understanding and prediction of hydrate accumulations in worldwide.

In February 2007, Rosenbaum joined Ray Boswell, NETL's Gas Hydrates Technology Manager, Rose, and team of scientists from BP Alaska, the United States Geological Survey, and Oregon State University, for a 22-day NETL/DOE sponsored drilling and coring program on the Alaska North Slope. The Mount Elbert Well successfully demonstrated, i) a pioneering gas hydrate exploration methodology which penetrated two hydrate-bearing sandstone intervals, and ii) the safe and effective application of advanced technologies to core, drill, and evaluate the reservoir properties of hydrate bearing intervals. The NETL scientists guided sample selection and preservation, conducted the extraction and on-site geochemical analysis of pore waters from hydrate bearing

reservoirs, and conducted unique experiments using an NETL-developed device to measure the changes in sediment thermal conductivity.

During the summer of 2006, Rose and Boswell logged more than 1,300 hours on the deck of the drilling vessel *Joides Resolution* offshore of India. Boswell, co-chief scientist, and Rose, project sedimentologist, conducted 12-hour shifts leading the collection, description, and sub-sampling of gas hydrate-bearing sediment cores.

NETL scientists will continue to make critical contributions to projects that advance the understanding of the geological controls, occurrence, and physical behavior of gas hydrates in nature through a variety of efforts including geological characterization, numerical simulation, and laboratory based studies.

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